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FUNCTIONAL PRODUCTS, THEIR PROPERTIES AND FUNCTIONS

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Abstract

The article deals with the functions and properties of functional dairy products according to the systematization of terms, in relation to functional foods initiated by the introduction of GOST 52349-2005 "Food, food functional. Terms and definitions ", which was introduced on July 10, 2006.

Keywords: prebiotics, probiotics, bifidobacteria, lactobacilli, fruit and berry enrichments, thickeners, fermented sour milk desserts.

In recent years, there has been a steady increase in the consumption of functional products. Their popularity is due to the variety of taste, composition, consistency, which meets the needs of a wide range of consumers. Ingredients that give products functional properties meet the following requirements: have a positive effect on nutrition and health, are safe in terms of a balanced diet, have accurate physico-chemical parameters, should not reduce the nutritional value of products, taken orally as food, have the appearance ordinary food, be natural [2].

The standard defines a functional food product as a product intended for systematic consumption in the diet of all age groups of a healthy population. It reduces the risk of eating disorders, maintains and improves health due to the presence of physiologically functional foods.

Physiologically functional food ingredient - a substance or complex of substances of animal, vegetable, microbiological, mineral origin or identical to natural, as well as living microorganisms that are part of a functional food product that can have a subtle effect on one or more physiological functions, metabolic processes in the human body under the condition of systematic consumption in quantities ranging from 10 to 50% of the daily physiological needs. Physiologically functional food ingredients include biologically active and (or) physiologically valuable, safe for health: dietary fiber, vitamins, minerals, polyunsaturated fatty acids, probiotics, prebiotics or synbiotics.

Functional products, similar to dietary supplements, perform the following functions:

Compensate for deficiencies of biologically active components in the body;

Support normal functional activity of organs and systems;

Reduce the risk of various diseases, create a dietary background;

Support the beneficial microflora in the human body and the normal functioning of the gastrointestinal tract.

The EU Food Act defines a functional product as follows: "Functional food is any modified food or food ingredient that may have a beneficial effect on human health in addition to the traditional nutrients it contains." According to some sources, the European market for functional products in 2003 was estimated at \$ 3.3 billion, of which functional dairy products accounted for 65%, bakery products - 9, various pastes, soft cheeses, jams and other types 23, drinks that have a positive effect on human health (vitaminized and therapeutic for athletes, the elderly, pregnant women, etc.) - 3%. In the United States in 2003, revenue from the sale of functional foods to the population amounted to 44.1 billion dollars [2].

The main function of food can be considered to strengthen human health. According to the definition of the Federal Law on the Production of Foodstuffs and Essentials (LMBG, Germany), foodstuffs are substances that are mainly consciously and unconsciously

consumed by a person in unaltered culinary or processed form to meet his food needs and / or taste habits. Most foods can combine both food and flavor, and some can be purely food or purely flavoring.

Although food has always served as a food source, the concept of "functional food" has been introduced, which, due to the presence of certain additives that have

a positive (beneficial) effect on human health, can fill the nutrient deficiency.

The development of new functional products is growing (table 1), although the methodological issues of development and implementation of functional products are clearly insufficiently covered.

Table 1

Promising functional foods	
Functional products	The mechanism of action is offered
Provide cancer prevention	Antioxidant / antimutagenic and immunomodulatory, regulatory apoptosis
Provide prevention of cardiovascular diseases	Antioxidant, vascular strengthening, improving blood circulation
Antidiabetic	Hypoglycemic
To prevent obesity	Normalizes lipid metabolism and intake
To improve memory	Improves blood supply to the brain
Prevent aging	Antioxidant, apoptosis-regulating

The functional effect of cereal-based products depends on the content of soluble and insoluble dietary fiber, which reduces the risk of cardiovascular disease, lowers cholesterol and stabilizes digestive functions, preventing diseases of the gastrointestinal tract.

Dairy products are a valuable source of such functional ingredients as calcium and riboflavin. Their functional properties can be enhanced by the addition of vitamins A, D, E, β -carotene and minerals, as well as dietary fiber such as pectin, bifidobacteria (table 2).

Table 2

Foods as natural sources of functional ingredients			
Natural cereals	Dairy products	Vegetable fat	Natural juices and drinks
Dietary fiber	Calcium	Linoleic acid	Vitamins C and B
Vitamins A, B, E,	Riboflavin	Linolenic acid	β -carotene
Calcium	Lactic acid strains <i>Acidophilus</i> and <i>bifidum</i> ,	ω -3 fatty acids	Soluble dietary fiber
Phytoelements	Peptides Linoleic acid	Vitamins	Phytoelements

Functional dairy products can be effective in preventing cardiovascular, cancer, gastrointestinal diseases, osteoporosis.

The use of sour-milk desserts with bifidogenic properties expands the range of products that can normalize the imbalance of intestinal microbiocynosis in the human body and stimulate the intestinal microflora. [2].

Margarine and vegetable oils - the main sources of unsaturated fatty acids help prevent cardiovascular disease. Ingredients such as vitamin D, some triglycerides, structured lipids can be included in their formulation to enhance the functional effect. These low energy products are also effective in preventing obesity.

Drinks can be considered technological enough to create new types of functional foods. In addition, fruit

and vegetable juices, as an important group of soft drinks, contain vitamin C, β -carotene and some B vitamins. The introduction of new functional ingredients is not difficult. Enriched with vitamins, trace elements, dietary fiber, drinks can be used to prevent cardiovascular, gastrointestinal, cancer, as well as intoxications of various kinds [3].

The seven main groups of functional ingredients are most effectively used: dietary fiber (soluble and insoluble); vitamins A, B, D; minerals, including calcium, iron; products with polyunsaturated compounds (vegetable oils, fish oil, ω -3 fatty acids); antioxidants (β -carotene, ascorbic acid, tocopherol); prebiotics (fructooligosaccharides, inulin, lactose, lactic acid); probiotics, which include bifidobacteria, lactobacilli, yeast (table 3).

Table 3

Oral consumption (regular food);	
Dietary fiber	Presence of beneficial properties for nutrition and health;
Vitamins (C, D, group B)	Availability of beneficial properties for nutrition and health;
Minerals (Ca, Fe)	The daily consumption rate is approved by specialists;
Lipids containing polyunsaturated higher fatty acids	Availability of accurate physicochemical characteristics and appropriate methods for their determination;
Antioxidants (β -carotene, tocopherols)	Lack of ability to reduce the nutritional value of the food product; Oral consumption (regular food);
Some types of beneficial microorganisms (lactic acid bacteria)	Must be natural
Oligosaccharides	Not available in dosage forms (pills, capsules, powders);

Physiological action
 Maintaining normal cholesterol levels
 Preservation of healthy bones and teeth
 Energy supply of the main groups and features of functional products

It is these four groups of products and are considered the most technological to create a functional diet.

In the structure of modern nutrition, functional foods occupy an intermediate place between the usual and therapeutic products that are part of the therapeutic diet (table 4).

Table 4

Functional products in modern nutrition		
Mass consumption products	Functional products (physiologically functional products)	Therapeutic food
food products intended for feeding the main groups of the population, produced by traditional technology.	Foods intended for the nutrition of the main groups of the population are useful for health	food products for special purposes (for certain groups of the population) as a therapeutic method in the complex therapy of diseases characterized by altered chemical composition and physical properties

The same group includes products of therapeutic and preventive nutrition, which are intended for persons exposed to adverse factors of the production environment.

In creating a functional product, one of the main stages is the choice and justification of functional ingredients that form its new properties associated with the ability of products to exhibit physiological effects. Positive effect

The next aspect is related to the potential ability of functional ingredients to change the consumer properties of a food product, which should not differ from traditional ones. Therefore, their choice and justification should be made taking into account the set of consumer properties and the target physiological action of the functional product being created [1].

An important direction that guarantees the solution of the problem of optimal supply of micronutrients to the population is the regular inclusion in the diet of foods containing these compounds. The content of vitamins in foods enriched with them is calculated in such a way as to only supplement their deficiency and not create the problem of hypervitaminosis, especially given the unsatisfactory level of vitamin supply.

Among polyunsaturated ω -3 fatty acids are most intensively involved in the construction of cell membranes, the formation of the nervous system, visual system, reduce the risk of cardiovascular disease, atherosclerosis, affect mental and intellectual development.

DSM Nutritional Products obtains ω -3 polyunsaturated fatty acids (ROPUFA brand) from deep-sea marine fish oil. In oil form, they are suitable for modern functional types of margarine or mayonnaise.

Features of creating new types of functional products

An important area of development of the food industry is the development of new types of functional foods.

Functional products are an important part of the diet of modern man, as evidenced by the growth of their consumption in the world. The new trend of development of production of functional products has become widespread mainly in foreign countries. Thus, in the

United States, the growth rate of production of functional products exceeds the performance of the food industry as a whole (Fig. 3.10).

Annual sales of functional products in the UK, Germany and France are \$ 1.03 billion. USA. The largest share is occupied by Germany (406 million US dollars), followed by France (336 million US dollars) and Great Britain (285 million US dollars).

The need to develop functional products in Ukraine is due to the deterioration of the ecological situation, including pollution of the environment with harmful substances, changes in the lifestyle of the population and disruption of the structure of human nutrition. With a decrease in the number of bifidobacteria, a person becomes vulnerable to food allergies, colds, and this leads to intestinal dysfunction, disorders of mineral, protein and fat metabolism.

The volume of production of functional products on the world market is estimated at 1.4-1.7 billion US dollars. Of these, 65% are dairy foods.

The following ingredients are most often used in the design of functional products:

- hydrocolloids and protein-sugar complexes;
- sweeteners;
- plant extracts;
- vitamin and mineral complexes;
- dietary fiber;
- complexes of polyunsaturated fatty acids.

Vegetable raw materials are used quite intensively for the design of functional products. For example, emulsifiers offer extracts of wild saponin-containing raw materials - Manchurian aralia root and licorice root, which contain triterpene glycosides as surfactants (surfactants). These extracts can replace emulsifiers of animal origin, which are traditionally used in the production of food emulsions. Licorice roots and Manchurian aralia also contain phenolic compounds with antiradical and antioxidant activity. In combination with minerals, extracts of these plants can be purposefully used to create emulsion products for functional purposes.

An integrated approach to the development and creation of a functional product is as follows:

- targeted selection of functional ingredients;
- selection of products that provide easy assimilation of functional ingredients;

technological properties of functional ingredients; creating an image of a functional product through the visual range and sensory properties of products.

When developing functional products based on the specifics of organoleptic characteristics, the consumer should focus on the perception of the functional properties they carry. For example, the company "Scorpio-Aroma" (Russia) has specially developed a series of flavors for functional products:

fruits and berries with floral nuances (assorted fruits with hints of violet and aloe);
grapefruit with a hint of raspberries and flowers;
red fruit with mint;
fruit in honey;

rose with a hint of citrus fruits;
rose with a hint of oriental fruit;
heavenly apples in honey.

Tonic and tonic properties of selected ingredients do not try to form an adequate attitude to the functional product.

The following flavors are considered promising: Carrots with cream, Tea with lemon, Banana with herbs, Cranberries with pine needles, Fruit muesli, Cereals in honey, Ice cream with fruit, Chocolate with fruit, Chocolate muesli, Grill [3].

The range of flavors that most clearly correspond to the development trends of the range of functional products is presented in table. 5.

Table 5

Range of flavors for functional products

Name flavor	Dosage, kg per 1000 kg of finished products	Taste range of the product
Rose with apricot	0.6-1.0	The aroma of a rose and the sweet taste of apricots add to the allow to give the product a shade of oriental lodges
Pineapple with pine needles	0,6—1,0	Pineapple, pine needles - provide the appropriate harmony, as pineapple is traditionally associated with fruit, which helps to reduce excess weight, and pine needles provide a general strengthening effect.
Carrots with cream	0,6—1,0	The aroma, traditional for the segment of "healthy eating", emphasizes the beneficial properties of the product
Cranberries with pine needles	0.6-1.0	Поєднання ягоди з хвойним відтінком несе в собі аромати живої природи
Tea with lemon	0.6-1.0	The astringency of the invigorating tea with a fresh lemon hue allows you to create a useful product for consumption
Ice cream with chocolate and hazelnut	0.6-1.0	The aroma and taste of children's favorite treats gives consumer appeal to products for schoolchildren
Fruit muesli	0.6-1.0	The aroma, traditional for the segment of "healthy eating" emphasizes the beneficial properties of the product

New products are often referred to as "special foods for health", "agromedical", "curative", "preventive", etc. They must combine not only energy and nutritional values, but also provide additional benefits. The creation of such products introduced a new concept in the food industry - "functional foods" (90s). In 1991, the production of food "foshu" - food with a specific therapeutic effect was enshrined in law.

Functional are food products that:

obtained from natural ingredients and contain a large number of BAS;

can and should be included in a person's daily diet; during use should regulate certain processes in the body (for example, stimulate immune responses, eliminate the development of certain diseases, etc.).

The design of functional foods includes the following stages:

selection of a specific food system for its modification as a functional product;

establishment of colloidal chemical properties of the selected food system;

determination of the chemical composition of the product and the necessary technological parameters to preserve their nutritional value;

choice of ingredients and food additives that correct the colloid-chemical and organoleptic properties of the food system;

study of combinations of food additives, ingredients, basic nutrients for a particular food system, which provides a synergistic effect in the case of their combined use;

development of technology for the manufacture of a new product using selected synergistic compositions, which allows to obtain a product with functional and organoleptic properties (qualitative and quantitative synergism);

It is important to choose the best ways to obtain functional products.

There are two ways to turn a regular product into a functional one:

the first is its enrichment with nutrients in the technological process; the second - the selection of raw materials with a given component composition.

The first method involves a technological increase in the level of BAS during food production. They can be enriched with both typical and atypical for them set of BAR.

The second method involves the selection of the diet of birds and animals, which allows you to regulate the chemical composition of eggs (increased carotenoid content, reducing the number of

bone cholesterol), milk (vitamin, mineral and fatty acid composition), meat (ratio of ω -3 and ω -6 fatty ac-

ids, reducing the proportion of highly saturated fatty acids, cholesterol). Genetic engineering can improve the composition and properties of plant raw materials.

Among the problems related to functional products and functional nutrition are topical issues discussed at the international conference [4].

in Kulmbasi (Germany) were: "The contribution of meat products in providing the population with iodine", "Functional foods - the importance of EU health requirements", "Functional fish foods", "Possibilities of using functional ballast substances in products with m "meat", "The use of probiotic bacteria in meat products", "Functional meat products - cooked sausages and offal sausages", "Functional food products - smoked sausage".

Scientific bases of creation of functional products

Modern nutrition science considers functional products to be man-made products designed to give them certain health-promoting properties.

The basic principle of creating functional products can be considered to strengthen human health by influencing certain physiological reactions of the body.

Functional products are traditionally divided into:

dietary, which are aimed at the treatment of alimentary-dependent human diseases:

preventive purposes aimed at preventing common diseases (cardiovascular, obesity):

specialized - narrowly focused on certain body functions (athletes):

enriched - to which certain micronutrients are added (or substituted);

Dietary supplements - carriers of micronutrients necessary for humans (vitamins, minerals, dietary fiber, prebiotics, etc.).

At the present stage of development, the relevance of functional products increases due to sedentary lifestyle and reducing the amount of food, as well as taking into account environmental aspects, due to which there is a need to strengthen the body's defenses with antioxidants, vitamins, trace elements and others.

Acquired the target direction of research in the direction of optimal nutrition under the guidance of the director of the Institute of Nutrition of the Russian Academy of Medical Sciences, Acad. VA Tutelyan. He believes that the diet of modern man should include three components: natural, fortified foods and dietary supplements (in the form of capsules, pills that contain missing or missing micronutrients).

One of the important tasks to improve the nutrition structure of the population is to increase the share of consumer products with high nutritional and biological value. It can be solved by increasing the production of a new generation of products - functional products. Particularly valuable are those groups of products that are systematically included in the diets of all groups. Their consumption should promote good health and reduce the risk of nutritional diseases due to the content of functional ingredients that can favorably affect one or more physiological functions and metabolic reactions of the human body.

You can improve the diet of people through one or more groups of functional products:

Traditional, which contain in their natural state a significant amount of physiologically functional ingredients or their groups (juices, fruits, vegetables, grains);

Traditional, in which the content of harmful components is technologically reduced, the presence of which in the product prevents the manifestation of biological or physiological activity or biodegradability of substances that are part of functional ingredients (products with low cholesterol, salt, low molecular weight carbohydrates and etc.);

Traditional products, additionally enriched with functional ingredients through various technological operations.

The category of enriched functional products is considered to be the most promising action of dietary correction.

Enriched functional products are obtained by adding to traditional one or more physiologically functional ingredients (dietary fiber, vitamins, minerals, polyunsaturated fatty acids, bifidobacteria, oligosaccharides, phospholipids, amino acids, antioxidants, etc.) in order to eliminate them in the human body. It is important to organize the process of food enrichment on scientifically sound principles, taking into account medical and biological, technological, functional, marketing requirements.

Taking into account the technological specifics of production, we can conditionally distinguish three main groups of functional products. The first includes traditional products that contain a significant amount of physiologically functional ingredients in their natural form. This group consists of all dairy and fermented milk products, which include valuable components (calcium, peptides, riboflavin, live lactic acid microorganisms).

The second group includes products with technologically reduced content of harmful components, the presence of which impairs their bioavailability. The list of such ingredients includes cholesterol, animal fats with a high content of saturated fatty acids, hydrogenated oils containing trans isomeric fatty acids, low molecular weight carbohydrates (sucrose), sodium, the source of which

The third group of functional products includes fortified foods with appropriate essential nutrients - vitamins, macro- and microelements.

ment, dietary fiber, polyunsaturated fatty acids, phospholipids and other biologically active substances of natural origin.

By origin, functional products are divided into natural, which contain a significant amount of physiologically functional ingredients, and artificial, which receive functional properties due to technological processing. During the processing, some of the compounds can be removed, the functional ingredients can be concentrated, the appropriate biologically active substances can be added or a combination of these techniques can be used.

For some functional products it is very important to provide an increased and balanced amount of appropriate micronutrients-nutraceuticals [5].

Attitudes towards dietary supplements and functional foods have been largely articulated and regulated

at the legislative level. As early as 1996-1998, a number of laws and bylaws appeared, which created the primary legal basis. By-laws are Government Resolutions, sanitary norms and rules, various orders, resolutions, methodical instructions of the Ministry of Health, etc.

The regulatory framework for functional products is partly laid down in the following Laws:

"On the sanitation of the population"

"On food safety and quality"

"About advertising"

"On consumer protection"

The Regulations on the Procedure for Examination and Hygienic Certification of Biologically Active Food Additives were also approved.

The Ministry of Health has approved a number of basic and additional documents that determine the procedure for registration of dietary supplements. Among them an important place is occupied by methodical instructions for determining the safety of dietary supplements, sanitary norms and rules, hygienic requirements for quality and safety of food raw materials and food.

State registration is carried out through the Department of State Sanitary and Epidemiological Surveillance of the Ministry of Health. If as a result of the examination it is established that this product is safe and meets all the rules and hygiene standards, the data on dietary supplements are entered in the State Register, and companies are issued a certificate.

The main stages of creating a functional product are:

nutrition monitoring;

determination of medical and hygienic requirements for the functional product;

selection of an adequate product and functional ingredient;

modification of a food product into a functional one, proof of a positive effect. All functional foods contain ingredients that provide them

functional properties. D. Potter identified seven main types of functional ingredients: dietary fiber (soluble and insoluble), vitamins, minerals, ω -3 fatty acids, antioxidants, oligosaccharides, probiotics.

Presence of scientifically substantiated properties useful for nutrition and health;

Norm of daily consumption approved by specialists;

Safety from the standpoint of a balanced diet;

Presence of exact physical and chemical characteristics and exact methods of their definition;

Lack of ability to reduce the nutritional value of food;

Oral consumption as part of food, not in the form of dosage forms (pills, capsules, powders);

Naturalness.

Functional products according to the peculiarities of composition, properties and technological specifics of production are divided into the following main categories:

traditional products that naturally contain a significant amount of physiologically functional ingredient or group thereof;

traditional products in which the content of components harmful to health, which prevent the manifestation of physiological action or biodegradability of the functional ingredients that are part of the product, is technologically reduced;

traditional products, which are further enriched with functional ingredients through a variety of technological techniques.

Functional products are divided into the following categories (MV Roberfroid):

natural products that contain the required group of functional ingredients;

natural products from which a component has been removed that prevents the manifestation of physiological activity of the functional ingredients present in them;

natural products in which the original potential functional ingredients are modified in such a way that they begin to show their biological and physiological activity, or this activity is enhanced;

natural food products, in which due to modifications the bioavailability of the functional ingredients included in them is enhanced;

natural products that are further enriched with a functional ingredient or group of ingredients; natural or artificial products, which as a result of a combination of technological techniques acquire the ability to maintain and improve human health or reduce the risk of disease.

The following groups of functional products can be distinguished on the market in Ukraine: breakfast cereals, dairy products, margarines and soft drinks, special foods. The following groups develop most dynamically: milk and dairy products, oil and fat products, confectionery.

One of the significant achievements of the late twentieth century is the development of a fundamentally new concept of "probiotics and functional nutrition", which includes fundamental and applied aspects of human health, medicine, nutrition, and biotechnology. The term "functional nutrition" is now understood as such biologically active food additives and foods that, when included in the diet, provide the human body not only with energy and plastic material, as they control and model (optimize) specific physiological functions, biochemical reactions, help maintain health, reduce the risk of disease and accelerate recovery, ie have a biocorrective effect.

Despite the low share of probiotics and functional foods (no more than 3% of total food), according to the world's leading experts in nutrition and medicine, in the next 15 to 20 years it will reach 30% of the total food market. Due to this, they will displace most traditional medicines by 35... 50%.

When creating recipes for functional products, it is preferable to use multifactor methods with a significant number of limitations that take into account energy, nutritional value and taste. Due to the large list of raw materials, as well as the number of physico-chemical and technological factors used in their creation, it is difficult to fully solve the problem without the use of information technology - computer expert system of adequate nutrition.

The basis of this system is a database of knowledge, data and goals that accumulate information about models, methods and algorithms for developing individual products and diets according to the criteria of nutritional, biological and energy value, structural compliance and physiological adequacy to the needs of the organism.

The use of an expert system of adequate nutrition allows for minimal.

Choose the composition of the combined food according to the selected criteria with the set restrictions on the basis of various composition of components. Variation of criteria and restrictions gives the chance to reach the maximum efficiency of application of raw materials, ingredients and actually finished products and to pick up the most rational technologies of their production.

In the process of developing the concept of functional nutrition, the substantiation of the relevant terms took an important place. For example, Acad. VA Tutelyan called functional foods "products with specified properties, enriched with essential nutrients and micronutrients." A detailed formulation is given by one of the leading specialists in functional nutrition BA Shenderov: "Functional food products are products of natural or artificial origin, which are intended for systematic daily consumption and have a regulatory effect on physiological functions, biochemical reactions and psychosocial behavior through normalization of its microecological status". The main purpose of these products is to restore the normal microflora of the human body [6].

As early as the beginning of the twentieth century, the Russian scientist II Mechnikov predicted that the cause of many diseases is altered microflora, and later he proved the interaction between the state of the microflora, quality and life expectancy. The microbiological conditionality of many diseases served as a basis for the development of a new direction in medicine and the food industry - functional nutrition.

The potential of the functional food market is 120 billion US dollars or 5% of the total world food market.

In Japan, there is the FOSHU (Food for Specified Health Use) program, adopted in 1975 and substantially revised in 1991. It emerged after a decade of special research by leading institutes commissioned by the Ministry of Health and Welfare as a mechanism for quality health improvement. population. The basis of this program is a list of functional supplements, most of which are aimed at normalizing the intestinal microflora. This program is similar to programs in Germany, France, Finland, Sweden, USA, Canada, China, Korea and many other countries.

Based on this material, we can draw the following conclusions:

change in the ecological conditions of human existence leads to the gradual replacement of the traditional range of food products with functional ones;

the market of functional products is one of the promising areas of development;

due to the specific and biological action of functional products requires enhanced state and public control over compliance with the requirements for quality,

safety, usefulness, adequacy of their use, which requires the development of the necessary legal framework;

rapid development of the market of functional products requires their appropriate classification;

the existing range of functional products is developing disproportionately, along with oversaturated assortment groups (soft drinks, sour milk drinks), there are groups that have a limited number of product names. Therefore, research is needed to expand the range of functional products of other groups;

a prerequisite for the development of the market for functional products is the widest, most proven and clear information for consumers about the composition and physiological effects of such products. This will help eliminate speculation and falsification in terms of production and trade.

The current state of the commodity market in Ukraine also requires the development of approaches to the identification of functional products, which is a necessary component of assessing the consumer properties of goods in terms of detection of counterfeiting, certification testing and other measures.

One of the main areas of functional nutrition can be considered therapeutic and prophylactic. It offers a clearer differentiation in relation to certain factors that affect the human body. Therapeutic nutrition should not only increase the body's defenses, reactivity, but also have a specific direction of action. To this end, appropriate foods and diets include components that supplement the deficiency of BAS, improve the functions of mainly damaged organs and systems, neutralize harmful substances, promote their rapid excretion from the body.

In the process of creating therapeutic and prophylactic foods, an important role is given to medical and biological requirements for raw materials, finished products and dietary supplements, the ratio of additives used, etc. These foods are used for therapeutic and surgical practices and can be of three types: oral, enteral and parenteral.

The most common are oral foods with a meat, dairy, vegetable or combination base.

The development of therapeutic and prophylactic foods is carried out in two directions:

creation on the basis of already developed products of general purpose with inclusion in their compounding of one or several components of a target direction, or with replacement of components of a product on others;

development of new treatment and prevention products without taking into account the basis of recipes and technologies of traditional foods.

The general approach to the development of formulations of therapeutic and prophylactic foods is shown in.

The development of recipes for therapeutic and prophylactic foods is carried out in stages. The creation of therapeutic and prophylactic foods is based on certain recommendations:

determining the type of disease for which the product is being developed;

study of the features of the disease;

study of medical recommendations on methods and types of preparation of products and dishes that are allowed or prohibited for consumption;

selection of the basis for product development;

the degree of readiness of the product;

choice of product type by consistency;

analysis of dietary supplements used for relevant diseases;

study of medical and biological requirements for dietary supplements and manufactured products;

justification for the use and selection of one or more dietary supplements for the developed product, their share;

choice of method of administration of dietary supplements;

analysis of the compatibility of several used dietary supplements;

analysis of the compatibility of dietary supplements and the chosen basis of the product;

assessment of the impact of dietary supplements on the quality of the finished product;

justification of the mode, duration and method of administration depending on the form of the product;

application of mathematical modeling and forecasting during the development of recipes and technologies;

development of product formulation;

development of technology for obtaining therapeutic and prophylactic food;

study of quality indicators of the finished product;

production of an experimental batch of product;

development and approval by scientific documentation and recommendations for use;

creation of a label and marking;

conducting clinical trials;

obtaining a quality certificate;

product sales.

1. Choice of product orientation

2. Choosing the basis of the product

3. Processing of the percentage of the product base

4. Choice of dietary supplements that provide product focus

The main stages of creating a functional product are:

nutrition monitoring;

determination of medical and hygienic requirements for the functional product;

selection of an adequate product and functional ingredient;

modification of a food product into a functional one, proof of a positive effect. All functional foods contain ingredients that provide them functional properties.

D. Potter identified seven main types of functional ingredients: dietary fiber (soluble and insoluble), vitamins, minerals, ω -3 fatty acids, antioxidants, oligosaccharides, probiotics.

Requirements for functional ingredients

Presence of scientifically substantiated properties useful for nutrition and health;

Norm of daily consumption approved by specialists;

Safety from the standpoint of a balanced diet;

Presence of exact physical and chemical characteristics and exact methods of their definition;

Lack of ability to reduce the nutritional value of food;

Oral consumption as part of food, not in the form of dosage forms (pills, capsules, powders);

Functional products according to the peculiarities of composition, properties and technological specifics of production are divided into the following main categories:

- traditional products that naturally contain a significant amount of physiologically functional ingredient or group thereof;

- traditional products in which the content of components harmful to health, which prevent the manifestation of physiological action or biodegradability of the functional ingredients that are part of the product, is technologically reduced;

- traditional products, which are further enriched with functional ingredients through a variety of technological techniques.

Functional products are divided into the following categories (MV Roberfroid):

- natural products that contain the required group of functional ingredients;

- natural products from which a component has been removed that prevents the manifestation of physiological activity of the functional ingredients present in them;

natural products in which the original potential functional ingredients are modified in such a way that they begin to show their biological and physiological activity, or this activity is enhanced;

natural food products, in which due to modifications the bioavailability of the functional ingredients included in them is enhanced;

- natural products that are further enriched with a functional ingredient or group of ingredients; natural or artificial products, which as a result of a combination of technological techniques acquire the ability to maintain and improve human health or reduce the risk of disease.

The following groups of functional products can be distinguished on the market in Ukraine: breakfast cereals, dairy products, margarines and soft drinks, special foods. The following groups develop most dynamically: milk and dairy products, oil and fat products, confectionery.

One of the significant achievements of the late twentieth century is the development of a fundamentally new concept of "probiotics and functional nutrition", which includes fundamental and applied aspects of human health, medicine, nutrition, and biotechnology. The term "functional nutrition" is now understood as such biologically active food additives and foods that, when included in the diet, provide the human body not only with energy and plastic material, as they control and model (optimize) specific physiological functions, biochemical reactions, help maintain health, reduce the risk of disease and accelerate recovery, ie have a biocorrective effect [7].

Despite the low share of probiotics and functional foods (no more than 3% of total food), according to the

world's leading experts in nutrition and medicine, in the next 15 to 20 years it will reach 30% of the total food market. Due to this, they will displace most traditional medicines by 35... 50%.

When creating recipes for functional products, it is preferable to use multifactor methods with a significant number of limitations that take into account energy, nutritional value and taste. Due to the large list of raw materials, as well as the number of physico-chemical and technological factors used in their creation, it is difficult to fully solve the problem without the use of information technology - computer expert system of adequate nutrition.

The basis of this system are knowledge bases, data and goals, which accumulate information about models, methods and algorithms for developing individual products and diets according to the criteria of nutritional, biological and energy value, structural compliance and physiological adequacy of the body.

The use of an expert system of adequate nutrition allows for minimal

Choose the composition of the combined food according to the selected criteria with the set restrictions on the basis of various composition of components. Variation of criteria and restrictions gives the chance to reach the maximum efficiency of application of raw materials, ingredients and actually finished products and to pick up the most rational technologies of their production.

In the process of developing the concept of functional nutrition, the substantiation of the relevant terms took an important place. For example, Acad. VA Tutelyan called functional foods "products with specified properties, enriched with essential nutrients and micronutrients." A detailed formulation is given by one of the leading specialists in functional nutrition BA Shenderov: "Functional food products are products of natural or artificial origin, which are intended for systematic daily consumption and have a regulatory effect on physiological functions, biochemical reactions and psychosocial behavior through normalization of its microecological status ". The main purpose of these products is to restore the normal microflora of the human body.

As early as the beginning of the twentieth century, the Russian scientist II Mechnikov predicted that the cause of many diseases is altered microflora, and later he proved the interaction between the state of the microflora, quality and life expectancy. The microbiological conditionality of many diseases served as a basis for the development of a new direction in medicine and the food industry - functional nutrition.

The potential of the functional food market is 120 billion US dollars or 5% of the total world food market.

In Japan, there is the FOSHU (Food for Specified Health Use) program, adopted in 1975 and substantially revised in 1991. It emerged after a decade of special research by leading institutes commissioned by the Ministry of Health and Welfare as a mechanism for quality health improvement. population. The basis of this program is a list of functional supplements, most of which are aimed at normalizing the intestinal microflora. This program is similar to programs in Germany,

France, Finland, Sweden, USA, Canada, China, Korea and many other countries.

On the basis of the considered material it is possible to make the following conclusions:

- change in the ecological conditions of human existence leads to the gradual replacement of the traditional range of food products with functional ones;
- the market of functional products is one of the promising areas of development;
- due to the specific and biological action of functional products requires enhanced state and public control over compliance with the requirements for quality, safety, usefulness, adequacy of their use, which requires the development of the necessary legal framework;
- rapid development of the market of functional products requires their appropriate classification;
- the existing range of functional products is developing disproportionately, along with oversaturated assortment groups (soft drinks, sour milk drinks), there are groups that have a limited number of product names. Therefore, research is needed to expand the range of functional products of other groups;
- A prerequisite for the development of the market for functional products is the widest, most proven and clear information for consumers about the composition and physiological effects of such products. This will help eliminate speculation and falsification in terms of production and trade.

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The development of therapeutic and prophylactic foods is carried out in two directions:

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- assessment of the impact of dietary supplements on the quality of the finished product;
- justification of the mode, duration and method of administration depending on the form of the product;
- application of mathematical modeling and forecasting during the development of recipes and technologies;
- development of product formulation;
- development of technology for the treatment and prevention of food;
- study of quality indicators of the finished product;
- production of an experimental batch of product;
- development and approval of scientific documentation and recommendations for use;
- creation of a label and marking;
- conducting clinical trials;

- obtaining a quality certificate;
 - product sales.
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To enhance the therapeutic and prophylactic effect, extracts of medicinal herbs are enriched with malt extract from sprouted barley grains. Barley-malt extract has been recognized as a dietary product and the basis for many drugs [9]. The most valuable in malt extract are protein substances and a set of amino acids. The therapeutic and prophylactic effect of malt extract is also determined by the vitamin and mineral composition.

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